

CLAIMS

1. A universal joint, comprising:

an input shaft;

a pair of yoke arms provided for said input shaft;

an output shaft;

a pair of yoke arms provided for said output shaft;

a cross member having four spider arms, each crossing another in a cross pattern;

two bearings provided between the tip parts of two of said four spider arms, which are disposed oppositely to each other and two yoke arms of said input shaft; and

two bearings provided between the tip parts of the rest two of said four spider arms, which are disposed oppositely to each other and two yoke arms of said output shaft,

wherein said universal joint further includes a resistance applying mechanism that generates the maximum resistance load in an oscillating movement of each of said two spider arms when axes of said two spider arms are included in a plane that includes the axes of both of said input and output shafts.

2. A universal joint according to claim 1,

wherein said resistance applying mechanism is configured so that at least one of said bearings has a resistance load

that varies in accordance with an oscillating angle.

3. A universal joint according to claim 2,

wherein said bearing used as said resistance applying mechanism is formed with a substantially oval yoke hole formed in said yoke arm and a substantially oval tip part of said spider arm.

4. A universal joint according to claim 3,

wherein a bearing cup is press-fit in said substantially oval yoke hole formed in said yoke arm and a plurality of needles are provided between the inner surface of this bearing cup and said substantially oval tip part of said spider arm.

5. A universal joint according to claim 1,

wherein said resistance applying mechanism is configured by a cam surface formed at an end surface of said spider arm and an engaging projection provided in said yoke arm and coming in contact with said cam surface.

6. A universal joint according to claim 5,

wherein a bearing cut is press-fit in a circular yoke hole formed in said yoke arm and a plurality of needles are provided between the inner surface of said bearing cup and a circular

tip part of said spider arm, and said engaging projection is formed at the bottom of said bearing cup.

7. A universal joint according to any of claims 1 to 6,
wherein said resistance applying mechanism is provided at either of said input shaft side or output shaft side.

8. A universal joint according to any of claims 1 to 6,
wherein said resistance applying mechanism is provided at both of said input shaft and output shaft sides.

9. A steering device for vehicle, wherein the universal joint according to any of claims 1 to 8 is provided between a steering column and a steering mechanism at the side of vehicle body.

10. A universal joint assembly for vehicle,
including two universal joints configured according to any of claims 1 to 8 and an intermediate shaft:

wherein both of said two universal joints have crossing angles that are substantially equal; and

said intermediate shaft is connected to the output shaft of one of said universal joints and the output shaft of the other.